MS-9856

Industrial Computer Board



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Trademarks

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Revision History

Revision	Revision History	Date
V1.0	First release	August 2009

Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

- Visit the MSI website for FAQ, technical guide, BIOS updates, driver updates, and other information: ***http://www.msi.com/index.php?func=service***
- Contact our technical staff at: ***http://ocss.msi.com***

Safety Instructions

- Always read the safety instructions carefully.
- Keep this User's Manual for future reference.
- Keep this equipment away from humidity.
- Lay this equipment on a reliable flat surface before setting it up.
- The openings on the enclosure are for air convection hence protects the equipment from overheating. DO NOT COVER THE OPENINGS.
- Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
- Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
- Always Unplug the Power Cord before inserting any add-on card or module.
- All cautions and warnings on the equipment should be noted.
- Never pour any liquid into the opening that could damage or cause electrical shock.
- If any of the following situations arises, get the equipment checked by service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment does not work well or you can not get it work according to User's Manual.
  - The equipment has dropped and damaged.
  - The equipment has obvious sign of breakage.

  DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT UNCONDITIONED, STORAGE TEMPERATURE ABOVE 60°C (140°F), IT MAY DAMAGE THE EQUIPMENT.

CAUTION: Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.

警告使用者:
這是甲類資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。

廢電池請回收
For better environmental protection, waste batteries should be collected separately for recycleing special disposal.

FCC-B Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures listed below.

N1996

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Notice 1

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2

Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

Micro-Star International
MS-9856

OIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) this device may not cause harmful interference, and
2) this device must accept any interference received, including interference that may cause undesired operation.

WEEE Statement

ENGLISH

To protect the global environment and as an environmentalist, MSI must remind you that...
Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC, which takes effect on August 13, 2005, products of "electrical and electronic equipment" cannot be discarded as municipal waste anymore and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life. MSI will comply with the product take back requirements at the end of life of MSI-branded products that are sold into the EU. You can return these products to local collection points.

DEUTSCH

Hinweis von MSI zur Erhaltung und Schutz unserer Umwelt
Gemäß der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte dürfen Elektro- und Elektronik-Altgeräte nicht mehr als kommunale Abfälle entsorgt werden. MSI hat europaweit verschiedene Sammel- und Recyclingunternehmen beauftragt, die in die Europäische Union in Verkehr gebrachten Produkte, am Ende seines Lebenszyklus zurückzunehmen. Bitte entsorgen Sie dieses Produkt zum gegebenen Zeitpunkt ausschliesslich an einer lokalen Altgerätesammelstelle in Ihrer Nähe.

FRANÇAIS

En tant qu'écologiste et afin de protéger l'environnement, MSI tient à rappeler ceci...
Au sujet de la directive européenne (EU) relative aux déchets des équipement électriques et électroniques, directive 2002/96/EC, prenant effet le 13 août 2005, que les produits électriques et électroniques ne peuvent être déposés dans les décharges ou tout simplement mis à la poubelle. Les fabricants de ces équipements seront obligés de récupérer certains produits en fin de vie. MSI prendra en compte cette exigence relative au retour des produits en fin de vie au sein de la communauté européenne. Par conséquent vous pouvez retourner localement ces matériels dans les points de collecte.

РУССКИЙ

Компания MSI предпринимает активные действия по защите окружающей среды, поэтому напоминаем вам, что....
В соответствии с директивой Европейского Союза (ЕС) по предотвращению загрязнения окружающей среды использованным электрическим и электронным оборудованием (директива WEEE 2002/96/EC), вступающей в силу 13 августа 2005 года, изделия, относящиеся к электрическому и электронному оборудованию, не могут рассматриваться как бытовой мусор, поэтому производители вышеперечисленного электронного оборудования обязаны принимать его для переработки по окончании срока службы. MSI обязуется соблюдать требования по приему продукции, проданной под маркой MSI на территории ЕС, в переработку по окончании срока службы. Вы можете вернуть эти изделия в специализированные пункты приема.

ESPAÑOL

MSI como empresa comprometida con la protección del medio ambiente, recomienda:
Bajo la directiva 2002/96/EC de la Unión Europea en materia de desechos y/o equipos electrónicos, con fecha de rigor desde el 13 de agosto de 2005, los productos clasificados como "eléctricos y equipos electrónicos" no pueden ser depositados en los contenedores habituales de su municipio, los fabricantes de equipos electrónicos, están obligados a hacerse cargo de dichos productos al termino de su período de vida. MSI estará comprometido con los términos de recogida de sus productos vendidos en la Unión Europea al final de su periodo de vida. Usted debe depositar estos productos en el punto limpio establecido por el ayuntamiento de su localidad o entregar a una empresa autorizada para la recogida de estos residuos.

NEDERLANDS

Om het milieu te beschermen, wil MSI u eraan herinneren dat….
De richtlijn van de Europese Unie (EU) met betrekking tot Vervuiling van Electrische en Electronische producten (2002/96/EC), die op 13 Augustus 2005 in zal gaan kunnen niet meer beschouwd worden als vervuiling. Fabrikanten van dit soort producten worden verplicht om producten retour te nemen aan het eind van hun levenscyclus. MSI zal overeenkomstig de richtlijn handelen voor de producten die de merknaam MSI dragen en verkocht zijn in de EU. Deze goederen kunnen geretourneerd worden op lokale inzamelingspunten.

SRPSKI

Da bi zaštitili prirodnu sredinu, i kao preduzeće koje vodi računa o okolini i prirodnoj sredini, MSI mora da vas podesti da…
Po Direktivi Evropske unije ("EU") o odbačenoj ekektronskoj i električnoj opremi, Direktiva 2002/96/EC, koja stupa na snagu od 13. Avgusta 2005, proizvodi koji spadaju pod "elektronsku i električnu opremu" ne mogu više biti odbačeni kao običan otpad i proizvođači ove opreme biće prinuđeni da uzmu natrag ove proizvode na kraju njihovog uobičajenog veka trajanja. MSI će poštovati zahtev o preuzimanju ovakvih proizvoda kojima je istekao vek trajanja, koji imaju MSI oznaku i koji su prodati u EU. Ove proizvode možete vratiti na lokalnim mestima za prikupljanje.

POLSKI

Aby chronić nasze środowisko naturalne oraz jako firma dbająca o ekologię, MSI przypomina, że...
Zgodnie z Dyrektywą Unii Europejskiej ("UE") dotyczącą odpadów produktów elektrycznych i elektronicznych (Dyrektywa 2002/96/EC), która wchodzi w życie 13 sierpnia 2005, tzw. "produkty oraz wyposażenie elektryczne i elektroniczne " nie mogą być traktowane jako śmieci komunalne, tak więc producenci tych produktów będą zobowiązani do odbierania ich w momencie gdy produkt jest wycofywany z użycia. MSI wypełni wymagania UE, przyjmując produkty (sprzedawane na terenie Unii Europejskiej) wycofywane z użycia. Produkty MSI będzie można zwracać w wyznaczonych punktach zbiorczych.

TÜRKÇE

Çevreci özelliğiyle bilinen MSI dünyada çevreyi korumak için hatırlatır:
Avrupa Birliği (AB) Kararnamesi Elektrik ve Elektronik Malzeme Atığı, 2002/96/EC Kararnamesi altında 13 Ağustos 2005 tarihinden itibaren geçerli olmak üzere, elektrikli ve elektronik malzemeler diğer atıklar gibi çöpe atılamayacak ve bu elektonik cihazların üreticileri, cihazların kullanım süreleri bittikten sonra ürünleri geri toplamakla yükümlü olacaktır. Avrupa Birliği'ne satılan MSI markalı ürünlerin kullanım süreleri bittiğinde MSI ürünlerin geri alınması isteği ile işbirliği içerisinde olacaktır. Ürünlerinizi yerel toplama noktalarına bırakabilirsiniz.

ČESKY

Záleží nám na ochraně životního prostředí - společnost MSI upozorňuje...
Podle směrnice Evropské unie ("EU") o likvidaci elektrických a elektronických výrobků 2002/96/EC platné od 13. srpna 2005 je zakázáno likvidovat "elektrické a elektronické výrobky" v běžném komunálním odpadu a výrobci elektronických výrobků, na které se tato směrnice vztahuje, budou povinni odebírat takové výrobky zpět po skončení jejich životnosti. Společnost MSI splní požadavky na odebírání výrobků značky MSI, prodávaných v zemích EU, po skončení jejich životnosti. Tyto výrobky můžete odevzdat v místních sběrnách.

MAGYAR

Annak érdekében, hogy környezetünket megvédjük, illetve környezetvédőként fellépve az MSI emlékezteti Önt, hogy ...
Az Európai Unió („EU") 2005. augusztus 13-án hatályba lépő, az elektromos és elektronikus berendezések hulladékairól szóló 2002/96/EK irányelve szerint az elektromos és elektronikus berendezések többé nem kezelhetőek lakossági hulladékként, és az ilyen elektronikus berendezések gyártói kötelessé válnak az ilyen termékek visszavételére azok hasznos élettartama végén. Az MSI betartja a termékvisszavétellel kapcsolatos követelményeket az MSI márkanév alatt az EU-n belül értékesített termékek esetében, azok élettartamának végén. Az ilyen termékeket a legközelebbi gyűjtőhelyre viheti.

ITALIANO

Per proteggere l'ambiente, MSI, da sempre amica della natura, ti ricorda che….
In base alla Direttiva dell'Unione Europea (EU) sullo Smaltimento dei Materiali Elettrici ed Elettronici, Direttiva 2002/96/EC in vigore dal 13 Agosto 2005, prodotti appartenenti alla categoria dei Materiali Elettrici ed Elettronici non possono più essere eliminati come rifiuti municipali: i produttori di detti materiali saranno obbligati a ritirare ogni prodotto alla fine del suo ciclo di vita. MSI si adeguerà a tale Direttiva ritirando tutti i prodotti marchiati MSI che sono stati venduti all'interno dell'Unione Europea alla fine del loro ciclo di vita. È possibile portare i prodotti nel più vicino punto di raccolta

TABLE OF CONTENTS

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Chapter 1
Overview

Thank you for choosing the MS-9856 v1.X, an excellent industrial computer board from MSI.

Based on the innovative **Intel® 945GSE** & **ICH7M** chipsets for optimal system efficiency, the MS-9856 accommodates the latest **Intel® ATOM N270** processor and supports up to 1 DDR2 533/400 SO-DIMM slot to provide the maximum of 1GB memory capacity.

In the advanced-level and mid-range market segment, the MS-9856 provides a high-performance solution for applications on digital signage, kiosk, gaming, and thin client.

Mainboard Specifications

Processor

- Intel ATOM N270 low power processor

FSB

- 533/ 400 MHz

Chipset

- North Bridge: Intel 945GSE chipset
- South Bridge: Intel ICH7M chipset

Memory

- 1 DDR2 533/400 SO-DIMM slot (200 pins / 1.8V)
- Supports the maximum of 1GB

LAN

- Gigabit Fast Ethernet by Intel 82574L GbE controller

SATA

- 2 SATAII ports by Intel ICH7M
- Storage and data transfers at up to 3Gb/s

CF

- Supports 1 CompactFlash slot with eject pin (Type III)

Video

- Intel GMA950 graphic engine
- Up to QXGA (2048 x 1536) resolution

Audio

- HDA Codec by Realtek ALC888
- Compliant with Azalia 1.0 specs

Connectors

- Back Panel I/O
  - 2 USB ports
  - 2 Gigabit LAN jacks
  - 1 DVI-I port
  - 1 RS-232/422/485 serial port

- Onboard Connectors/Pinheaders
  - 1 front audio pinheader
  - 1 USB 2.0 pinheader (2 ports)
  - 1 SPI Flash ROM pinheader (for debugging)
  - 4 serial port pinheaders
  - 4 In/ 4 Out GPIO pinheaders
  - 1 LVDS connector
  - 1 keyboard/mouse pinheader

Slot

- 1 Mini PCI-E slot

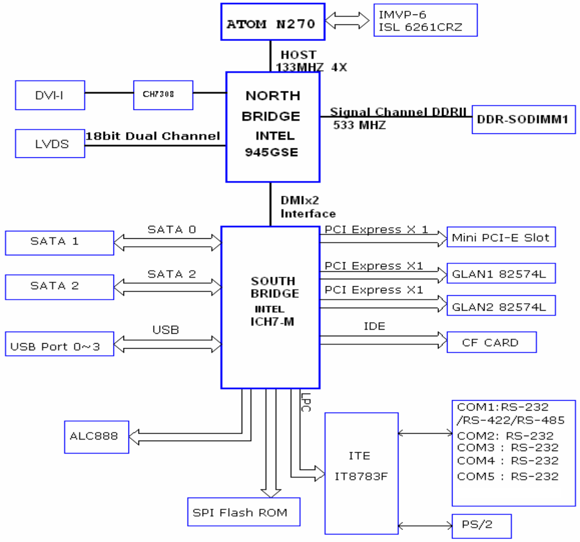
Form Factor

- 146mm x 102mm

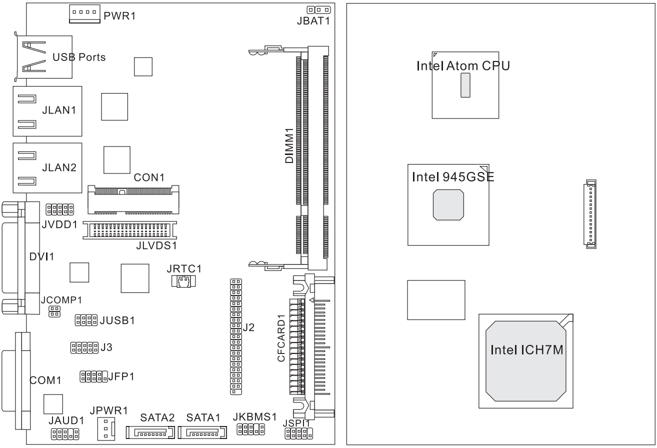
Environmental

- Operating Temperature: 0°C to 60°C
- Storage Temperature: -20°C to 80°C
- Humidity: 5% ~ 90% (non condensing)

Block Diagram

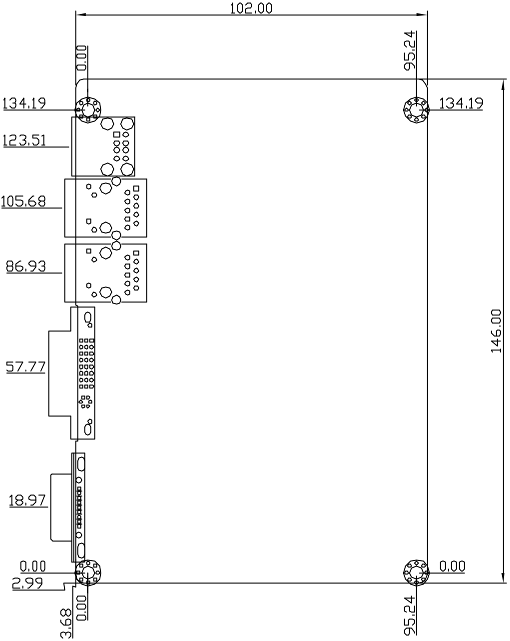


Mainboard Layout



MS-9856 v1.X Mainboard

Board Dimension



Safety Compliance & MTBF

Certification	Standard number		Title of standard
CE	RFI	EN 55022: 1998+A1: 2000+A2:2003 Class B	Product family standard
		EN 6100-3-2:2000 Class D	Limits for harmonic current emission
		EN 6100-3-3: 1995+A1:2001	Limitation of voltage fluctuation and flicker in low voltage supply system
	Immunity	EN 55024:1998+A1:2001+A2:2003	Product family standard
BSMI	CNS 13438 乙類 (1997年版)		
C-Tick	AS/NZS CISPR 22:2004		
FCC	FCC CFR Title 47 Part 15 Subpart B: 2005 Class B		
	CISPR 22: 2005		
VCCI	VCCI V-3:2004, Class B		
	VCCI V-4:2004, Class B		

MTBF - Reliability Prediction

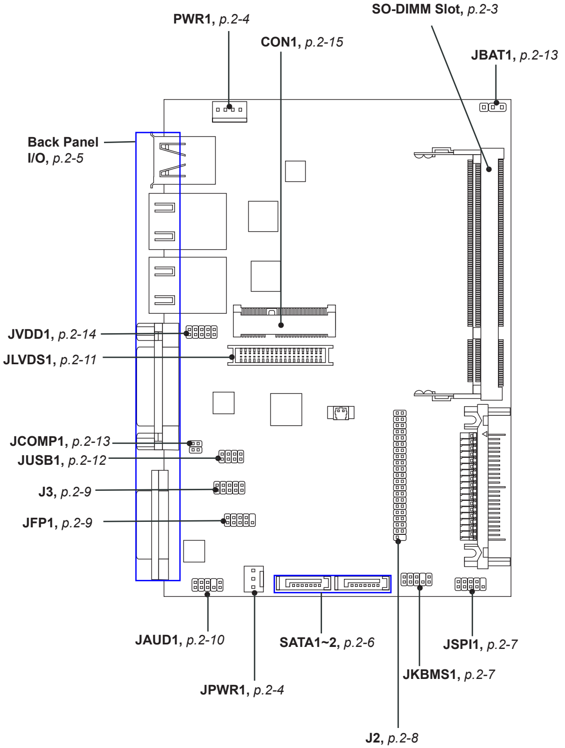
Calculation Model	**Operation Temperature (°C)**	**Operation Environment**	**Duty Cycle**	**MTBF (hr.)**
Telcordia Issue 1	45	GB, GC - Ground Benign, Controlled	50%	246,664

msi™

Chapter 2
Hardware Setup

This chapter provides you with the information on mainboard hardware configurations. Incorrect setting of jumpers and connectors may damage your mainboard. Please pay special attention not to connect these headers in wrong direction. DO NOT adjust any jumper while the mainboard is powered on.

Quick Components Guide



Memory

These DIMM slots are intended for memory modules.



DDR2 SO-DIMM Slot
200-pin, 1.8V

Installing Memory Modules

1. Locate the DIMM1 SO-DIMM slot. Align the notch on the DIMM with the key on the slot and insert the DIMM into the slot at 45-degree angle.
2. Push the DIMM gently forwards until the slot levers click and lock the DIMM in place. Follow the same procedures to install the second DIMM if necessary.
3. To uninstall the DIMM, flip the slot levers outwards and the DIMM will be released instantly.

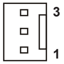
Important

You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.

Power Supply

5V/12V HDD Power Connector: JPWR1

This connector provides power to the hard disk drives.

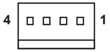


JPWR1

PIN	SIGNAL
1	GND
2	VCC5
3	+12V

12V System Power Connector: PWR1

This connector provides power to the system.



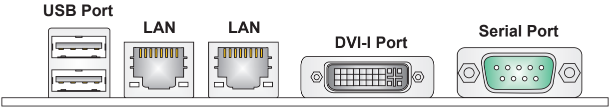
PWR1

PIN	SIGNAL
1	+12V
2	+12V
3	GND
4	GND

Important

*Power supply of **200watts** (and above) is highly recommended for system stability.*

Back Panel I/O

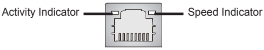


▸ USB Port

The USB (Universal Serial Bus) port is for attaching USB devices such as keyboard, mouse, or other USB-compatible devices.

▸ LAN

The standard RJ-45 LAN jack is for connection to the Local Area Network (LAN). You can connect a network cable to it.



		Left LED	Right LED
		Active LED	**100M/1000M Speed LED**
LED Color		Yellow	Green/Orange
10M Cable Plug-in	**No Transmission**	OFF	OFF
	Transition	Yellow (Blinking)	OFF
100M Cable Plug-in	**No Transmission**	OFF	Green (Lighting)
	Transition	Yellow (Blinking)	Green (Lighting)
1000M Cable Plug-in	**No Transmission**	OFF	Orange (Lighting)
	Transition	Yellow (Blinking)	Orange (Lighting)
In S3/S4/S5 Standby State		Green (Lighting)	OFF

▸ DVI-I Port

The DVI-I (Digital Visual Interface-Integrated) connector allows you to connect an LCD monitor. It provides a high-speed digital interconnection between the computer and its display device. To connect an LCD monitor, simply plug your monitor cable into the DVI connector, and make sure that the other end of the cable is properly connected to your monitor (refer to your monitor manual for more information.)

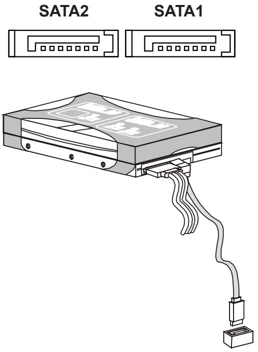
▸ Serial Port

The serial port is a 16550A high speed communications port that sends/ receives 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to the connector.

Connectors

Serial ATA II Connector: SATA1, SATA2

This connector is a high-speed Serial ATA II interface port. Each connector can connect to one Serial ATA II device.



Important

Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during transmission.

SPI Flash ROM Connector: JSPI1

This connector is used to flash SPI flash ROM.

JSPI1



PIN	SIGNAL	PIN	SIGNAL
1	VCC3_SB	2	VCC3_SB
3	SPI_MISO_F	4	SPI_MOSI_F
5	SPI_CS0_F#	6	SPI_CLK_F
7	GND	8	GND
9	SPI_HOLD#	10	NC

Keyboard/Mouse Connector: JKBMS1

This connector is used to connect PS/2 keyboard & mouse.

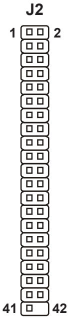
JKBMS1



PIN	SIGNAL	PIN	SIGNAL
1	VCC5	2	VCC5
3	NC	4	NC
5	GND	6	GND
7	MSCLK_PH#	8	KBCLK_PH#
9	MSDAT_PH#	10	KBDAT_PH#

Serial Port Connector: J2

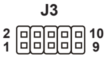
This connector is a 16550A high speed communications port that sends/receives 16 bytes FIFOs. You can attach serial devices to it through the optional serial port bracket.



PIN	SIGNAL	PIN	SIGNAL
1	COM_NDCD2	21	COM_NDCD4
2	COM_NRD2	22	COM_NRD4
3	COM_NTD2	23	COM_NTD4
4	COM_NDTR2	24	COM_NDTR4
5	GND	25	GND
6	COM_NDSR2	26	COM_NDSR4
7	COM_NRTS2	27	COM_NRTS4
8	COM_NCTS2	28	COM_NCTS4
9	VCC_COM2	29	VCC_COM4
10	No Connection	30	No Connection
11	COM_NDCD3	31	COM_NDCD5
12	COM_NRD3	32	COM_NRD5
13	COM_NTD3	33	COM_NTD5
14	COM_NDTR3	34	COM_NDTR5
15	GND	35	GND
16	COM_NDSR3	36	COM_NDSR5
17	COM_NRTS3	37	COM_NRTS5
18	COM_NCTS3	38	COM_NCTS5
19	VCC_COM3	39	COM_NRI5
20	No Connection	40	No Connection

Digital IO Connector: J3

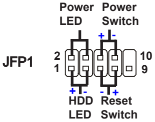
This connector is provided for the General-Purpose Input/Output (GPIO) peripheral module.



PIN	SIGNAL	PIN	SIGNAL
1	GND	2	VCC5
3	N_GPO 3	4	N_GPO 1
5	N_GPO 2	6	N_GPO 0
7	N_GPI 3	8	N_GPI 1
9	N_GPI 2	10	N_GPI 0

Front Panel Connector: JFP1

This front panel connector is provided for electrical connection to the front panel switches & LEDs and is compliant with Intel Front Panel I/O Connectivity Design Guide.

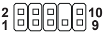


PIN	SIGNAL	DESCRIPTION
1	HD_LED +	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED -	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW -	Reset Switch low reference pull-down to GND
6	PWR_SW +	Power Switch high reference pull-up
7	RST_SW +	Reset Switch high reference pull-up
8	PWR_SW -	Power Switch low reference pull-down to GND
9	RSVD_DNU	Reserved. Do not use.
10	KEY	Key

Front Panel Audio Connector: JAUD1

This connector allows you to connect the front panel audio and is compliant with Intel Front Panel I/O Connectivity Design Guide.

JAUD1

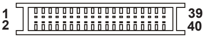


PIN	SIGNAL	DESCRIPTION
1	MIC_L	Microphone - Left channel
2	GND	Ground
3	MIC_R	Microphone - Right channel
4	PRESENCE#	Active low signal-signals BIOS that a High Definition Audio dongle is connected to the analog header. PRESENCE# = 0 when a High Definition Audio dongle is connected
5	LINE out_R	Analog Port - Right channel
6	MIC_JD	Jack detection return from front panel microphone JACK1
7	Front_JD	Jack detection sense line from the High Definition Audio CODEC jack detection resistor network
8	NC	No connection
9	LINE out_L	Analog Port - Left channel
10	LINEout_JD	Jack detection return from front panel JACK2

LVDS Flat Panel Connector: JLVDS1

The LVDS (Low Voltage Differential Signal) connector provides a digital interface typically used with flat panels. After connecting an LVDS interfaced flat panel to the JLVDS1, be sure to check the panel datasheet and set the JVDD1 jumper (p. 2-14) to proper power voltage.

JLVDS1



Display Matrix

	CRT	LVDS	DVI	HDMI
CRT		V	V	V
LVDS	V		V	V
DVI	V	V		V
HDMI	V	V	V	

SIGNAL	PIN		SIGNAL
+12V	2	1	+12V
+12V	4	3	+12V
GND	6	5	+12V
GND	8	7	VCC3/VCC5
LCD_VDD	10	9	LCD_VDD
LDDC_DATA	12	11	LDDC_CLK
LVDS_VDDEM	14	13	L_BKLTCTL
GND	16	15	L_BKLTEM
LA_DATA0	18	17	LA_DATA0#
LA_DATA1	20	19	LA_DATA1#
LA_DATA2	22	21	LA_DATA2#
LA_CLK	24	23	LA_CLK#
LA_DATA3	26	25	LA_DATA3#
GND	28	27	GND
LB_DATA0	30	29	LB_DATA0#
LB_DATA1	32	31	LB_DATA1#
LB_DATA2	34	33	LB_DATA2#
LB_CLK	36	35	LB_CLK#
LB_DATA3	38	37	LB_DATA3#
GND	40	39	GND

Front USB Connector: JUSB1

This connector, compliant with Intel I/O Connectivity Design Guide, is ideal for connecting high-speed USB interface peripherals such as USB HDD, digital cameras, MP3 players, printers, modems and the like.

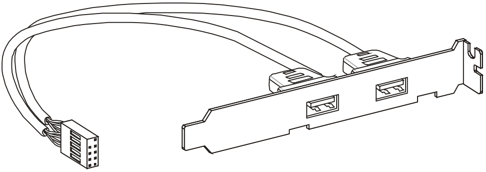
JUSB1



PIN	SIGNAL	PIN	SIGNAL
1	USB_RSTR	2	GND
3	SBD1+	4	SBD0-
5	SBD1-	6	SBD0+
7	GND	8	USB_RSTR

USB 2.0 Bracket

(Optional)



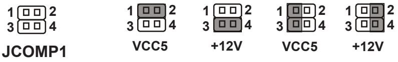
Important

Note that the pins of VCC and GND must be connected correctly to avoid possible damage.

Jumpers

COM Port Power Jumper: JCOMP1

These jumpers specify the operation voltage of the onboard serial ports.



Clear CMOS Jumper: JBAT1

There is a CMOS RAM onboard that has a power supply from an external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, set the jumper to clear data.

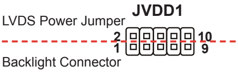


Important

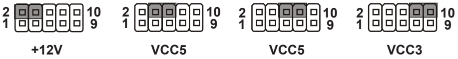
You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 pin position. Avoid clearing the CMOS while the system is on; it will damage the mainboard.

Backlight Connector & LVDS Power Jumper: JVDD1

The backlight connector is provided for LCD backlight options while the LVDS power jumper allows users to select the operation voltage of the LVDS interfaced flat panel.



PIN	SIGNAL
1	VCC5
3	L_BKLTCTL
5	INV_ON
7	GND
9	+12V

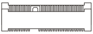


Slot

PCI (Peripheral Component Interconnect) Express Slot

The PCI Express slot supports the PCI Express interface expansion card.

The CON1 is a Mini PCI-E connector for wireless LAN, TV tuner, and Robson NAND Flash.



Mini PCI-E Slot

Important

When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

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Chapter 3
BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use.

You may need to run the Setup program when:

- An error message appears on the screen during the system booting up, and requests you to run SETUP.
- You want to change the default settings for customized features.

Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <DEL> key to enter Setup.

Press DEL to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it OFF and On or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Important

- *The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.*
- *Upon boot-up, the 1st line appearing after the memory count is the BIOS version. It is usually in the format:*

A9856IMS V1.0 073109 where:

1st digit refers to BIOS maker as A = AMI, W = AWARD, and P = PHOENIX.

2nd - 5th digit refers to the model number.

6th digit refers to the chipset as I = Intel, N = NVIDIA, A = AMD and V = VIA.

7th - 8th digit refers to the customer as MS = all standard customers.

V1.0 refers to the BIOS version.

073109 refers to the date this BIOS was released.

Control Keys

<↑>	Move to the previous item
<↓>	Move to the next item
<←>	Move to the item in the left hand
<→>	Move to the item in the right hand
<Enter>	Select the item
<Esc>	Jumps to the Exit menu or returns to the main menu from a sub-menu
<+/PU>	Increase the numeric value or make changes
<-/PD>	Decrease the numeric value or make changes
<F1>	General Help
<F9>	Load Optimized Defaults
<F8>	Load Fail-Safe Defaults
<F10>	Save all the CMOS changes and exit

Getting Help

After entering the Setup menu, the first menu you will see is the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

Sub-Menu

If you find a right pointer symbol (as shown in the right view) appears to the left of certain fields that means a sub-menu can be launched from this field.

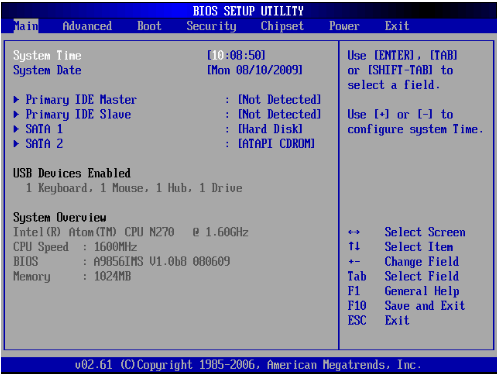


A sub-menu contains additional options for a field parameter. You can use arrow keys (↑↓) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc >.

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

The Menu Bar



▸ **Main**

Use this menu for basic system configurations, such as time, date etc.

▸ **Advanced**

Use this menu to setup the items of special enhanced features.

▸ **Boot**

Use this menu to specify the priority of boot devices.

▸ **Security**

Use this menu to set supervisor and user passwords.

▸ **Chipset**

This menu controls the advanced features of the onboard Northbridge and Southbridge.

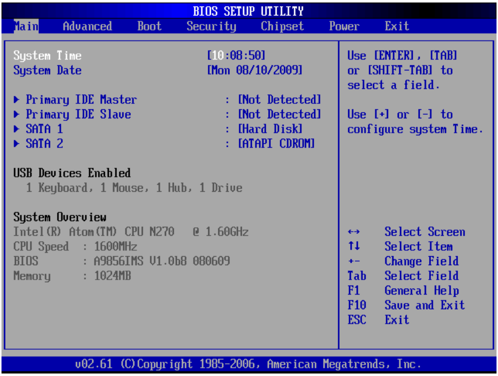
▸ **Power**

Use this menu to specify your settings for power management.

▸ **Exit**

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes.

Main



▸ **System Time**

This setting allows you to set the system time. The time format is <Hour> <Minute> <Second>.

▸ **System Date**

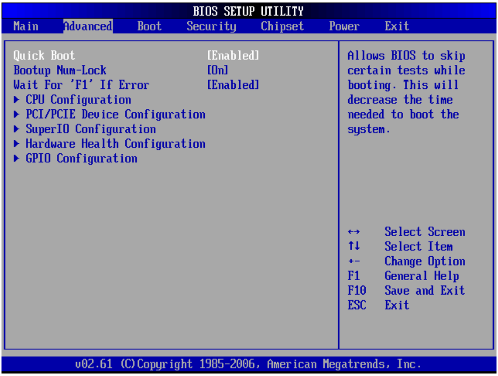
This setting allows you to set the system date. The date format is <Day>, <Month> <Date> <Year>.

▸ **Primary IDE Master/Slave, SATA1/2**

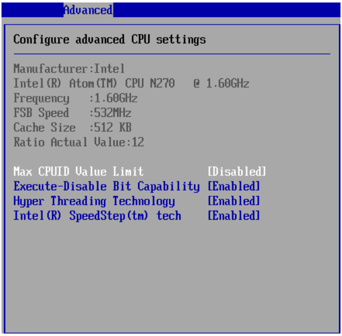
[Type]	Press PgUp/<+> or PgDn/<-> to select [Manual], [None] or [Auto] type. Note that the specifications of your drive must match with the drive table. The hard disk will not work properly if you enter improper information for this category. If your hard disk drive type is not matched or listed, you can use [Manual] to define your own drive type manually.
[LBA/Large Mode]	Enabling LBA causes Logical Block Addressing to be used in place of Cylinders, Heads and Sectors

[Block (Multi-Sector Transfer)]	Any selection except Disabled determines the number of sectors transferred per block
[PIO Mode]	Indicates the type of PIO (Programmed Input/Output)
[DMA Mode]	Indicates the type of Ultra DMA
[S.M.A.R.T.]	This allows you to activate the S.M.A.R.T. (Self-Monitoring Analysis & Reporting Technology) capability for the hard disks. S.M.A.R.T is a utility that monitors your disk status to predict hard disk failure. This gives you an opportunity to move data from a hard disk that is going to fail to a safe place before the hard disk becomes offline.
[32 Bit Data Transfer]	Enables 32-bit communication between CPU and IDE controller

Advanced



▸ CPU Configuration



▸ **Max CPUID Value Limit**

The Max CPUID Value Limit BIOS feature allows you to circumvent problems with older operating systems that do not support the Intel Pentium 4 processor with Hyper-Threading Technology. When enabled, the processor will limit the maximum CPUID input value to 03h when queried, even if the processor supports a higher CPUID input value. When disabled, the processor will return the actual maximum CPUID input value of the processor when queried.

▸ **Execute Disable Bit Capability**

Intel's Execute Disable Bit functionality can prevent certain classes of malicious "buffer overflow" attacks when combined with a supporting operating system. This functionality allows the processor to classify areas in memory by where application code can execute and where it cannot. When a malicious worm attempts to insert code in the buffer, the processor disables code execution, preventing damage or worm propagation.

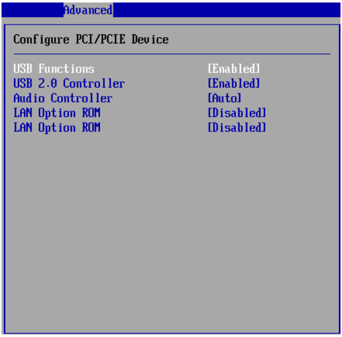
▸ **Hyper Threading Technology**

The processor uses Hyper Threading technology to increase transaction rates and reduces end-user response times. The technology treats the two cores inside the processor as two logical processors that can execute instructions simultaneously. In this way, the system performance is highly improved. If you disable the function, the processor will use only one core to execute the instructions. Please disable this item if your operating system doesn't support HT Function, or unreliability and instability may occur.

▸ **Intel(R) SpeedStep(tm) Tech**

EIST (Enhanced Intel SpeedStep Technology) allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production.

▸ PCI/PCIE Device Configuration



▸ USB Functions

This setting specifies the operation mode of the onboard USB controller.

▸ USB 2.0 Controller

This setting enables/disables the onboard USB controller.

▸ Audio Controller

This setting enables/disables the onboard audio controller.

▸ LAN Option ROM

The items enable or disable the initialization of the onboard LAN Boot ROMs during bootup. Selecting [Disabled] will speed up the boot process.

▸ Super IO Configuration



▸ Serial Port 1/2/3/4/5/6 Address, Serial Port 3/4/5 IRQ

Select an address and a corresponding interrupt for the specified serial ports.

▸ Serial Port 3/4/5 Mode

These settings specify the operation mode of the specified serial ports.

▸ Watch Dog

You can enable the system watch-dog timer, a hardware timer that generates either an NMI or a reset when the software that it monitors does not respond as expected each time the watch dog polls it.

▸ Watch Dog Timer Mode

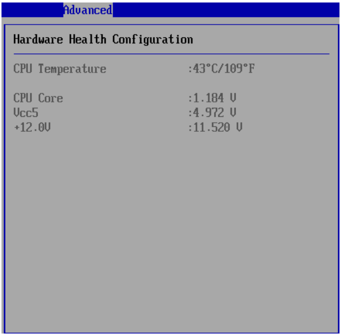
This setting specifies the Watch Dog Timer action.

▸ Watch Dog Timer

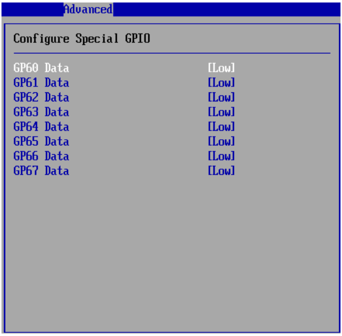
This setting specifies the Watch Dog Timer time out value.

▸ Hardware Health Configuration

These items display the current status of all monitored hardware devices/ components such as voltages, temperatures and all fans' speeds.



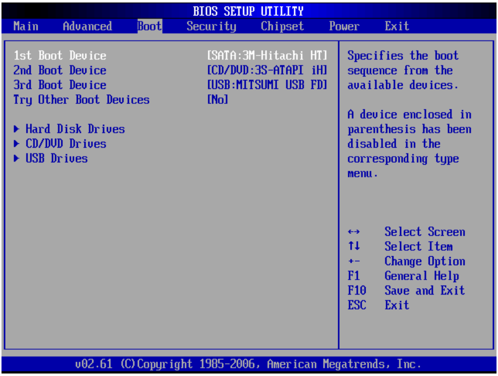
▸ GPIO Configuration



▸ GP 60/ 61/ 62/ 63/ 64/ 65/ 66/ 67 Data

These settings configure special GPIO data.

Boot



▸ **1st/2nd/3rd Boot Device**

The items allow you to set the sequence of boot devices where BIOS attempts to load the disk operating system.

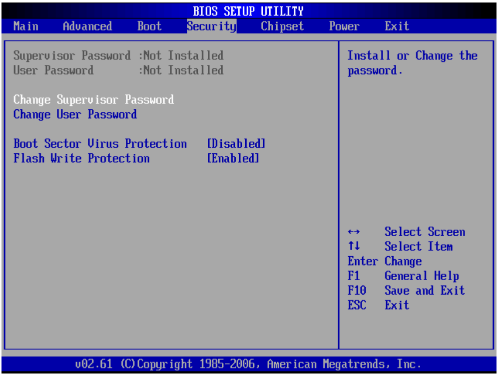
▸ **Try Other Boot Devices**

Setting the option to [Enabled] allows the system to try to boot from other device if the system fails to boot from the 1st/2nd/3rd boot device.

▸ **Hard Disk Drives, CD/DVD Drives, USB Drives**

These settings allow you to set the boot sequence of the specified devices.

SECURITY



▸ Supervisor Password / Change Supervisor Password

Supervisor Password controls access to the BIOS Setup utility. These settings allow you to set or change the supervisor password.

▸ User Password / Change User Password

User Password controls access to the system at boot. These settings allow you to set or change the user password.

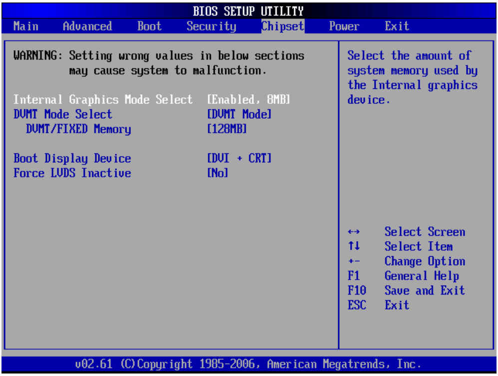
▸ Boot Sector Virus Protection

This function protects the BIOS from accidental corruption by unauthorized users or computer viruses.

▸ Flash Write Protection

This function protects the BIOS from accidental corruption by unauthorized users or computer viruses. When enabled, the BIOS data cannot be changed when attempting to update the BIOS with a Flash utility. To successfully update the BIOS, you will need to disable this Flash Protection function.

Chipset



▶ **Internal Graphics Mode Select**

The field specifies the size of system memory allocated for video memory.

▶ **DVMT Mode Select**

Intel's Dynamic Video Memory Technology (DVMT) allows the system to dynamically allocate memory resources according to the demands of the system at any point in time. The key idea in DVMT is to improve the efficiency of the memory allocated to either system or graphics processor.

It is recommended that you set this BIOS feature to DVMT Mode for maximum performance. Setting it to DVMT Mode ensures that system memory is dynamically allocated for optimal balance between graphics and system performance.

▶ **DVMT/FIXED Memory**

When set to DVMT/FIXED Mode, the graphics driver will allocate a fixed amount of memory as dedicated graphics memory, as well as allow more system memory to be dynamically allocated between the graphics processor and the operating system.

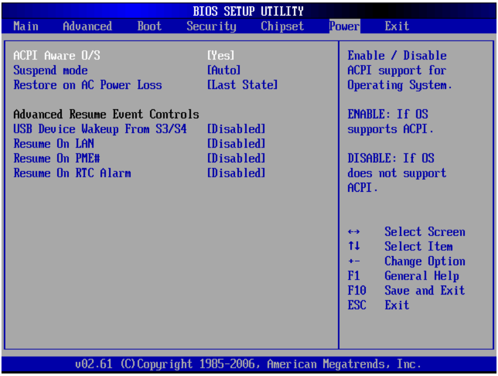
▸ **Boot Display Device**

Use the field to select the type of device you want to use as the display(s) of the system.

▸ **Force LVDS Inactive**

This setting determines whether to force the LVDS inactive or not.

Power



▸ ACPI Aware O/S

This setting enables/disables ACPI (Advanced Configuration and Power Interface) support for Operating System. Set to [No] if your OS doesn't support ACPI and set to [Yes] if ACPI is supported.

▸ Suspend Mode

This item specifies the power saving modes for ACPI function. If your operating system supports ACPI, you can choose to enter the Standby mode in S1 (POS) or S3 (STR) fashion through the setting of this field.

▸ Restore on AC Power Loss

This setting specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

[Power Off]	Leaves the computer in the power off state.
[Power On]	Leaves the computer in the power on state.
[Last State]	Restores the system to the previous status before power failure or interrupt occurred.

▸ **USB Device Wakeup From S3/S4**

This setting allows the activity of the USB device to wake up the system from the S3/S4 sleep state.

▸ **Resume On LAN**

This field specifies whether the system will be awakened from power saving modes when activity or input signal of onboard LAN is detected.

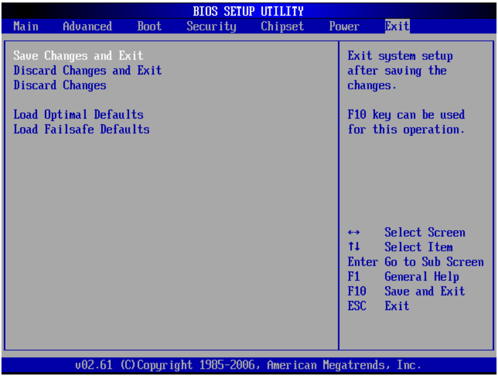
▸ **Resume On PME#**

When setting to [Enabled], the feature allows your system to be awakened from the power saving modes through any event on PME (Power Management Event).

▸ **Resume On RTC Alarm**

When [Enabled], your can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

Exit



▸ **Save Changes and Exit**

Save changes to CMOS and exit the Setup Utility.

▸ **Discard Changes and Exit**

Abandon all changes and exit the Setup Utility.

▸ **Discard Changes**

Abandon all changes and continue with the Setup Utility.

▸ **Load Optimal Defaults**

Use this menu to load the default values set by the mainboard manufacturer specifically for optimal performance of the mainboard.

▸ **Load Failsafe Defaults**

Use this menu to load the default values set by the BIOS vendor for stable system performance.

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Chapter 4
System Resources

This chapter provides information on the following system resources:

1. Watch Dog Timer Setting (p.4-2);

2. AMI POST Code (p.4-3);

3. Resource List (p.4-7).

Watch Dog Timer Setting

Software code

```
SIO_IDX equ 2Eh
SIO_DTA equ 2Fh
Timer equu 10; reset after 10 seconds
```

1. Enter configuration mode

```
mov   dx,SIO_IDX
mov   al,87h
out   dx,al
mov   al,01h
out   dx,al
mov   al,55h
out   dx,al
out   dx,al
```

2. Set to LDN 07

```
mov   dx,SIO_IDX
mov   al,07h
out   dx,al
mov   dx,SIO_DTA
mov   al,07h
out   dx,al
```

3. Set WatchDog Timer

```
mov   dx,SIO_IDX
mov   al,073h
out   dx,al
mov   dx,SIO_DTA
mov   al,Timer
out   dx,al
```

4. Exit configuration mode

```
mov   dx,SIO_IDX
mov   al,02h
out   dx,al
mov   dx,SIO_DTA
out   dx,al
```

AMI POST CODE

Bootblock Initialization Code Checkpoints

The Bootblock initialization code sets up the chipset, memory and other components before system memory is available. The following table describes the type of checkpoints that may occur during the bootblock initialization portion of the BIOS:

Checkpoint	Description
Before D1	Early chipset initialization is done. Early super I/O initialization is done including RTC and keyboard controller. NMI is disabled.
D1	Perform keyboard controller BAT test. Check if waking up from power management suspend state. Save power-on CPUID value in scratch CMOS.
D0	Go to flat mode with 4GB limit and GA20 enabled. Verify the bootblock checksum.
D2	Disable CACHE before memory detection. Execute full memory sizing module. Verify that flat mode is enabled.
D3	If memory sizing module not executed, start memory refresh and do memory sizing in Bootblock code. Do additional chipset initialization. Re-enable CACHE. Verify that flat mode is enabled.
D4	Test base 512KB memory. Adjust policies and cache first 8MB. Set stack.
D5	Bootblock code is copied from ROM to lower system memory and control is given to it. BIOS now executes out of RAM.
D6	Both key sequence and OEM specific method is checked to determine if BIOS recovery is forced. Main BIOS checksum is tested. If BIOS recovery is necessary, control flows to checkpoint E0. See Bootblock Recovery Code Checkpoints section of document for more information.
D7	Restore CPUID value back into register. The Bootblock-Runtime interface module is moved to system memory and control is given to it. Determine whether to execute serial flash.
D8	The Runtime module is uncompressed into memory. CPUID information is stored in memory.
D9	Store the Uncompressed pointer for future use in PMM. Copying Main BIOS into memory. Leaves all RAM below 1MB Read-Write including E000 and F000 shadow areas but closing SMRAM.
DA	Restore CPUID value back into register. Give control to BIOS POST (ExecutePOSTKernel). See POST Code Checkpoints section of document for more information.

POST Code Checkpoints

The POST code checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following table describes the type of checkpoints that may occur during the POST portion of the BIOS:

Checkpoint	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialized CMOS as mentioned in the Kernel Variable "wCMOSFlags."
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
08	Initializes the CPU. The BAT test is being done on KBC. Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
0A	Initializes the 8042 compatible Key Board Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.

Checkpoint	Description
13	Early POST initialization of chipset registers.
24	Uncompress and initialize any platform specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes different devices through DIM. See DIM Code Checkpoints section of document for more information.
2C	Initializes different devices. Detects and initializes the video adapter installed in the system that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
38	Initializes different devices through DIM. See DIM Code Checkpoints section of document for more information.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL or ESC keys to limit memory test. Display total memory in the system.
3C	Mid POST initialization of chipset registers.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, … etc.) successfully installed in the system and update the BDA, EBDA…etc.
50	Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.

Checkpoint	Description
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed / requested.
8C	Late POST initialization of chipset registers.
8E	Program the peripheral parameters. Enable/Disable NMI as selected
90	Late POST initialization of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPU's before boot, which includes the programming of the MTRR's.
A8	Prepare CPU for OS boot including final MTRR values.
A9	Wait for user input at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector. Deinitializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	End of POST initialization of chipset registers.
B1	Save system context for ACPI.
00	Passes control to OS Loader (typically INT19h).

Resource List

ICH7M GPIO

Pin	GPIO	Type	Multiplexed with	Power	Connect
AB18	GPIO0	I/O	BM_BUSY#	VCC3	PM_BMBUSY#
C8	GPIO1	I/O	REQ[5]#	VCC5	PREQ#5
G8	GPIO2	I/OD	PIRQE#	VCC5	VCC3
F7	GPIO3	I/OD	PIRQF#	VCC5	VCC3
F8	GPIO4	I/OD	PIRQG#	VCC5	VCC3
G7	GPIO5	I/OD	PIRQH#	VCC5	VCC3
AC21	GPIO6	I/O	Unmultiplexed	VCC3	ATADET0
AC18	GPIO7	I/O	Unmultiplexed	VCC3	SIO_OVT#
E21	GPIO8	I/O	Unmultiplexed	3VSB	PANEL+
E20	GPIO9	I/O	Unmultiplexed	3VSB	PANEL-
A20	GPIO10	I/O	Unmultiplexed	3VSB	VOLUME+
B23	GPIO11	I/O	SMBALERT#	3VSB	SMBALERT#
F19	GPIO12	I/O	Unmultiplexed	3VSB	SPI_HOLD_GPO#
E19	GPIO13	I/O	Unmultiplexed	3VSB	SIO_PME#
R4	GPIO14	I/O	Unmultiplexed	3VSB	VOLUME-
E22	GPIO15	I/O	Unmultiplexed	3VSB	3VSB
AC22	GPIO16	I/O	DPRSLPVR	VCC3	DPRSLPVR
D8	GPIO17	I/O	GNT5#	VCC3	PGNT#5
AC20	GPIO18	I/O	STPPCI#	VCC3	PM_STPPCI#
AH18	GPIO19	I/O	SATA1GP	VCC3	SATA1GP
AF21	GPIO20	I/O	STPCPU#	VCC3	PM_STPCPU#
AF19	GPIO21	I/O	SATA0GP	VCC3	SATA0GP
A13	GPIO22	I/O	REQ4#	VCC3	PREQ#4
AA51	GPIO23	I/O	LDRQ1#	VCC3	LPC_DRQ#1
B3	GPIO24	I/O	Unmultiplexed	3VSB	BIOS_WP#
D20	GPIO25	I/O	Unmultiplexed	3VSB	WLAN_PWRON
A21	GPIO26	I/O	Unmultiplexed	3VSB	NC
B12	GPIO27	I/O	Unmultiplexed	3VSB	NC
E23	GPIO28	I/O	Unmultiplexed	3VSB	NC
C3	GPIO29	I/O	OC5#	3VSB	3VSB

Pin	GPIO	Type	Multiplexed with	Power	Connect
A2	GPIO30	I/O	OC6#	3VSB	3VSB
B3	GPIO31	I/O	OC7#	3VSB	3VSB
AG18	GPIO32	I/O	CLKRUN#	VCC3	CLKRUN#
AC19	GPIO33	I/O	AZ_DOCK_EN#	VCC3	PRES2
U2	GPIO34	I/O	AZ_DOCK_RST#	VCC3	PRES3
AD21	GPIO35	I/O	SATACLKREQ#	VCC3	PRES1
AH19	GPIO36	I/O	SATA2GP	VCC3	SATA2GP
AE19	GPIO37	I/O	SATA3GP	VCC3	SATA3GP
AD20	GPIO38	I/O	Unmultiplexed	VCC3	NC
AE20	GPIO39	I/O	Unmultiplexed	VCC3	NC
A14	GPIO48	I/O	GNT4#	VCC3	PGNT#4
AG24	GPIO49	I/O	CPUPERGD	VTT	CPU_PWRGD

SIO GPIO

<table>
<tr><th>Pin</th><th>GPIO</th><th>Type</th><th>Function</th><th>Power</th><th>Description</th></tr>
<tr><td>60</td><td>GP56</td><td>O</td><td>#EN485
Default high for
RS232
function</td><td>VCC5</td><td>
<table>
<tr><th></th><th>RS232_EN</th><th>RS422_EN#</th><th>RS485_EN#</th></tr>
<tr><td>RS-232</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>RS-422</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>RS-485</td><td>0</td><td>1</td><td>0</td></tr>
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</td></tr>
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Default high for
RS232
function</td><td>VCC5</td><td>
<table>
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<tr><td>RS-232</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>RS-422</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>RS-485</td><td>0</td><td>1</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>59</td><td>GP55</td><td>O</td><td>EN232
Default high for
RS232
function</td><td>VCC5</td><td>
COM Type Select
<table>
<tr><th></th><th>RS232</th><th>RS422</th><th>RS485</th></tr>
<tr><td>232</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>#422</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>#485</td><td>1</td><td>1</td><td>0</td></tr>
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</td></tr>
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